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User manual for the JRC - ENCR Cancer Registries Data Quality Check Software (QCS)

QCS Version 1.7

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Abstract

In June 2015 the European Network of Cancer Registries (ENCR) and Directorate Joint Research Centre (JRC) of the European Commission launched the **2015 ENCR-JRC Call for Data** (http://encr.eu/index.php/activities/2015-call-for-data), offering ENCR-affiliated Cancer Registries a data-brokering service centralising the data acquisition procedures to serve the various European projects and studies data demands. The ENCR-JRC project "**Incidence and Mortality in Europe**" (http://www.encr.eu/index.php/activities/encr-jrc-project) is finalised to create a standardised and comparable database for monitoring cancer incidence and mortality and provide regular information on the burden of cancer in Europe.

The description, format, type of files and variables of the call are detailed in the submission guidelines, available both in the ENCR-JRC portal (https://portal-encr.jrc.ec.europa.eu/) and in the ENCR website at the following address: http://encr.eu/images/docs/2015_Data_Call/2015_ENCR_JRC_Call_for_Data_Version_1_1.pdf.

The reliability and utility of the information provided by cancer registries depends on the quality of the data collected; to this purpose, the ENCR, in cooperation with the JRC, set up a Working Group involving the main stakeholders in cancer data domain in order to establish a comprehensive and standardised list of data quality checks to be adopted by European cancer registries and European projects.

The outcome of the Working Group was a proposal on one common procedure for data quality checks among the European cancer registries, reaching final agreements on case definition, variables to be collected and their format, and internal consistency rules; the final outcome of the project was an ENCR-endorsed recommendations document to serve as guidelines during the data acquisition procedure.

Moreover, in order to enable cancer registries to perform data quality checks on their own and test the adherence of their data to the format required by the ENCR-JRC call for data, the JRC has developed a software respecting the rules codified in the above-mentioned guidelines. This software represents a first step in the process of providing cancer registries with a user friendly data-checking and quality control tool, and aims to standardize the procedures to be followed by European cancer registries when submitting data in order to improve their quality and comparability.

The present version of the JRC – ENCR cancer registries data quality check software includes

- checks on the data files format (for incidence, mortality, lifetables and population) and on variables names and order according to the data call protocol
- verification of variables values
- cross checks among variables, internal consistency

The software is distributed to cancer registries together with this manual.

1 Software overview

The JRC-ENCR Quality Check Software (QCS) is a stand-alone tool created for testing the quality of the European cancer registries' data. More specifically, it is aimed at testing the various European cancer registries' data submitted to the 2015 ENCR-JRC Call for Data, for adherence to:

- the 2014 ENCR-JRC report "A proposal on cancer data quality checks: one common procedure for European cancer registries"
- the 2015 ENCR-JRC call for data protocol
- the 2016 addendum to the 2014 report and the 2015 protocol

Registries can input incidence, mortality, population or life table files, and receive as output a set of files containing warnings or errors found in the submitted files.

This manual describes the functions of version 1.7: *JRC-ENCR-QCS-V1.7*

2 System Requirements and installation

This software was written for Windows operating systems that support Java (Windows 7 and above).

2.1 Minimum System Requirements

- Windows Vista SP2 *OR* Windows 7 *OR* Windows 8 Desktop
- Support for DirectX 9 graphics and 32 MB of graphics memory

A Pentium 2 266 MHz or faster processor with at least 512 MB of physical RAM is recommended.

You will also need a minimum of 220 MB of free disk space to efficiently run the software.

2.2 In case Java software is not installed on your computer

Java software is needed to run the JRC-ENCR-QCS. In case Java is not installed on your computer, please follow the following steps, otherwise go to **section 2.3.**

- Go to Java.com and click on the **Free Java Download** button
- On the browser download page click on the **Agree and Start Free Download** button
- The File Download dialog box appears, click on the **Save File** button
- Double click on the downloaded file in the Download Manager window or where you normally save downloaded files
- Depending on your security settings, you may be presented with dialog boxes asking for permission to continue. Confirm that you want to proceed with the installation
- The installation process starts. Click the **Install** button to accept the license terms and to continue

Please refer to the following screenshots, relative to Java Version 8 Update 101:

A few brief dialog boxes confirm the last steps of the installation process; click **Close** on the last dialog boxes. This will complete Java installation process.

Once Java software is correctly installed, you can install the JRC-ENCR-QCS.

Please refer to section 9 at the end of the present document about further information and troubleshooting related to Java.

2.3 How to install the QCS

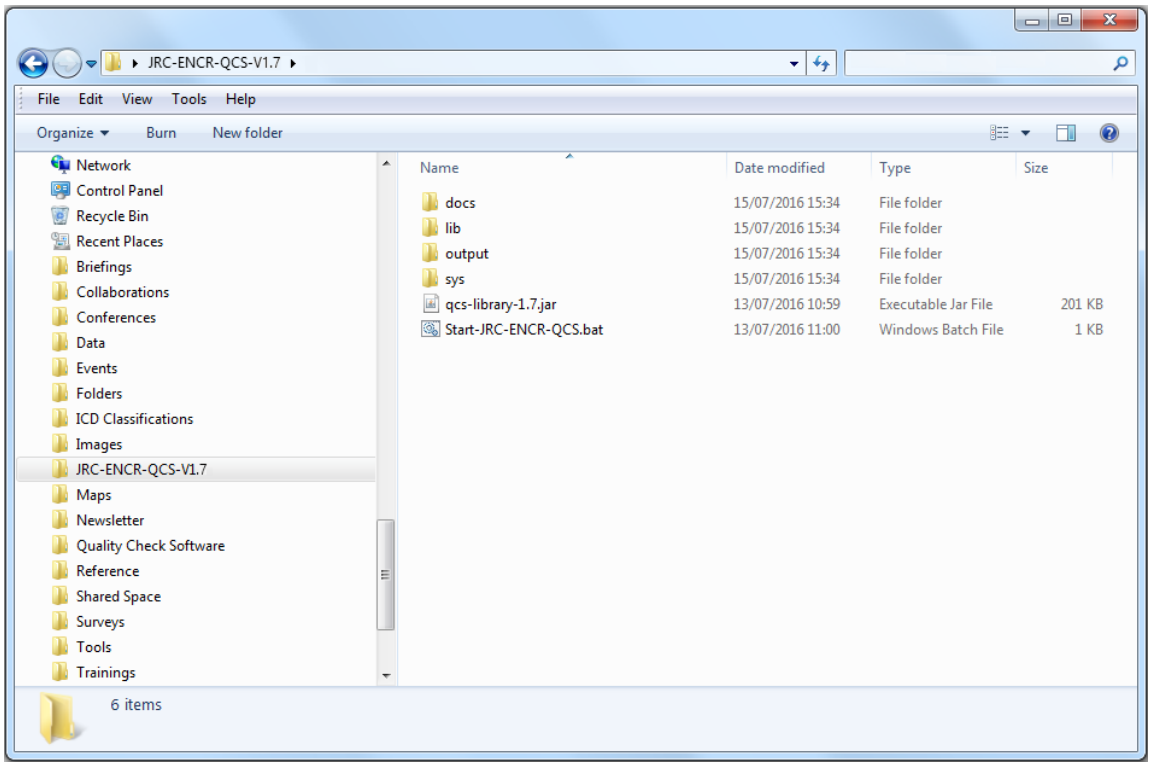
Once you download the latest version of the software in a single file called ***JRC-ENCR-QCS-V1.7.zip***, please extract it on your computer.

You will be able to access folder "*JRC-ENCR-QCS-v1.7"* with all the related subfolders.

2.4 Verify the correct installation

Navigate to the folder where you extracted the software and run it as specified in the next section of the manual, "*Running the Software*".

The expected directory structure is the following:



Folder *JRC-ENCR-QCS-V1.7* includes the following:

- The executable *Start-JRC-ENCR-QCS.bat* file
- The library *qcs-library-1.7.jar* file
- Folders *docs, lib, output* and *sys*

docs: this folder contains all the documentation files of the software, such as the user manual, the 2014 ENCR-JRC report "A proposal on cancer data quality checks: one common procedure for European cancer registries", the 2015 ENCR-JRC call for data protocol and the 2016 addendum in pdf format.

lib: this folder includes files used by the operational system of the software.

output: this folder includes four subfolders, one for each of the different error reports that the QCS produces for the four type of files: *Incidence, Mortality, Population, LifeTables.*

sys: this folder includes the following subfolders: *Config, Images, Log, Temp*. Those folders are used by the operational system of the QCS.

3 Starting and stopping the software

3.1 Running the software

- Please navigate to the folder in which you installed the software
- Find the Start-JRC-ENCR-QCS.bat file
- Double click on it. The user interface appears

Note: The software runs only from the file ending in *.bat.* In case you click on the *.jar* file by mistake the following alert message will be displayed: "*Please run the QCS from the .bat file*".

In this case, click *"OK"* and then run the software from the *.bat* file.

3.2 Closing the software

You can just close the window or select the "*Exit*" item in menu *File*.

4 How does the software work?

The analysis process of an input *incidence* file is described below. Similar processes are performed for the other allowed input data files: *mortality*, *population* and *life table* files.

The software assumes that input files have *csv* or *txt* extensions. Files with *csv* and *txt* extension are showed first by default. Selecting the option "*All files*", files with other extensions are displayed. A total of 56 fields, semicolon-separated, and in the correct format (see below) should be contained in the *incidence* file.

The list of fields, their order and the allowed values can be found in the *2015 ENCR-JRC Call for Data*.

The software checks every single record for:

- number of variables
- variable names
- presence of non-missing and non-blank values in the mandatory fields
- when applicable, the field content against a list of valid values. **Example**: patient's sex numeric value (variable 7_Sex) can be 1=male, 2=female, 3=other or 9=unknown. Every other value will produce an error
- field length, which must be within the allowed range. ***Example****: maximum length for patient ID (variable 2_Patient_ID) is 50 characters*
- dates validity (also if dates are not set in the future)
- record failing the edits described in the 2014 ENCR-JRC Report "one common procedure for European cancer registries" (see also the related 2016 addendum)

All the messages are saved in specific output files. Four output files are generated (names below are relative to the *incidence* file):

1) *QCS-Incidence-FormatErrors.txt* – file listing all the records with format errors (wrong number of fields, and so on)
2) *QCS-Incidence-Output.pdf* – file with error and warning messages in pdf format – includes multiple primary tumour warnings
3) *QCS-Incidence-Output.txt* – file with error and warning messages in *txt* format – includes multiple primary tumour warnings
4) *QCS-output-tabular-forExcel.csv* – file with error and warning messages in *csv* format. This file can be imported by most software packages to allow for advanced data manipulation, such as linkage with the original file using the unique id patient/tumour id. If multiple primaries are found they are not included in this file

5 Using the software

5.1 Checking the files

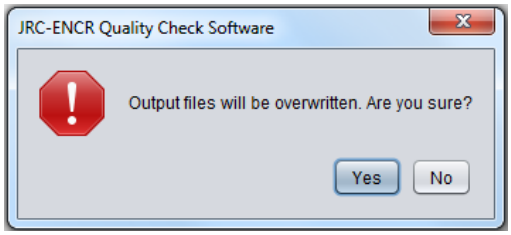
Select the type of file you want to check from the drop down menu.

If you want to check an incidence file:

- Select the "*Incidence File*" option from the drop down menu
- Press the "*Select File*" button
- A file browsing window appears
- Select the file

The software will accept only files with semicolon (**;**) separated values (with extension such as *csv* or *txt*).

- Navigate to the folder where the incidence file to be checked is located, select it and press "*Open*"
- The "*Start Checks*" button will then become active and the full path of the file you have chosen will be displayed in the text box on the left of the button
- Press the "*Start Checks*" button
- A dialog box with the following message will appear: "*Output files will be overwritten. Are you sure?*"



- If you have already run the checks on the incidence file, please notice that the output files will be overwritten. Please save them in a different folder or with a different name in case you want to keep them. After selecting "*Yes*", the software will run

If you run the software for the first time, or you close it and open it again, a message for the initialisation of the system will be displayed on the screen (see screenshot below). It may take up to a few minutes for the software to initialise. The initialisation sets files and space on the disk for efficient running the software. This is necessary only once per session; in case you close the software, the initialisation will be again performed.

Now the quality check procedure is running. The label of button "Start Checks" changes to "CANCEL", giving you the ability to stop the process. In this case, the following message is displayed in the text area: "*Processing interrupted by the user. Number of records read: …*"

In case the process is not interrupted, you will see a sequence of messages appearing in the display text box. Those messages inform the user about the different steps of the procedure (see screenshot below).

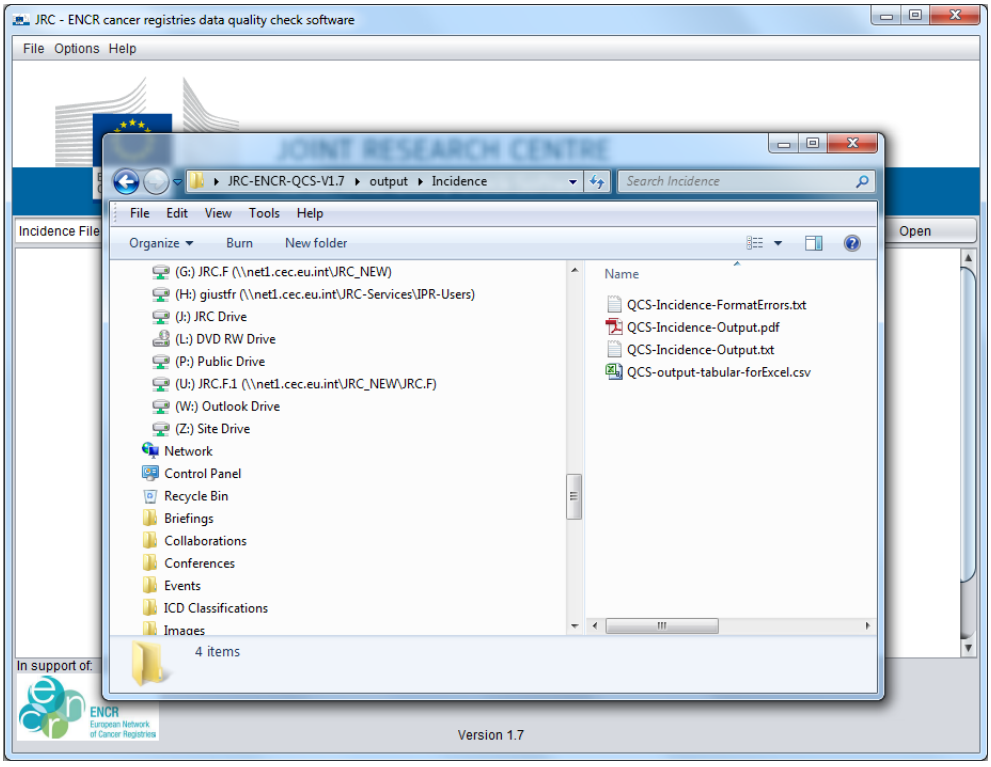
Once the procedure is ended, the button label will revert to "*Start Checks*" status and the software will be ready to check another file.

At the end, the window will display the frequencies with:

- Number of records processed
- Total number of errors
- Total number of warnings with Flag=0
- Total number of warnings with Flag=1
- Total number of records rejected (this happens when the headers are correct but some of the variables are not present, not even left blank or with missing value)
- Total number of duplicate records (same patient id and tumour id for more than one record)
- Total number of multiple primary cancers

Note that when you are checking a *mortality*, a *population* or a *life table* file, **the number of duplicated records** is not displayed, as the software is not checking for duplicated records in these types of file, as they contain aggregated data.

You can now access the outputs: by clicking on "*Open*", you can see folder "*output*", containing all the report files.



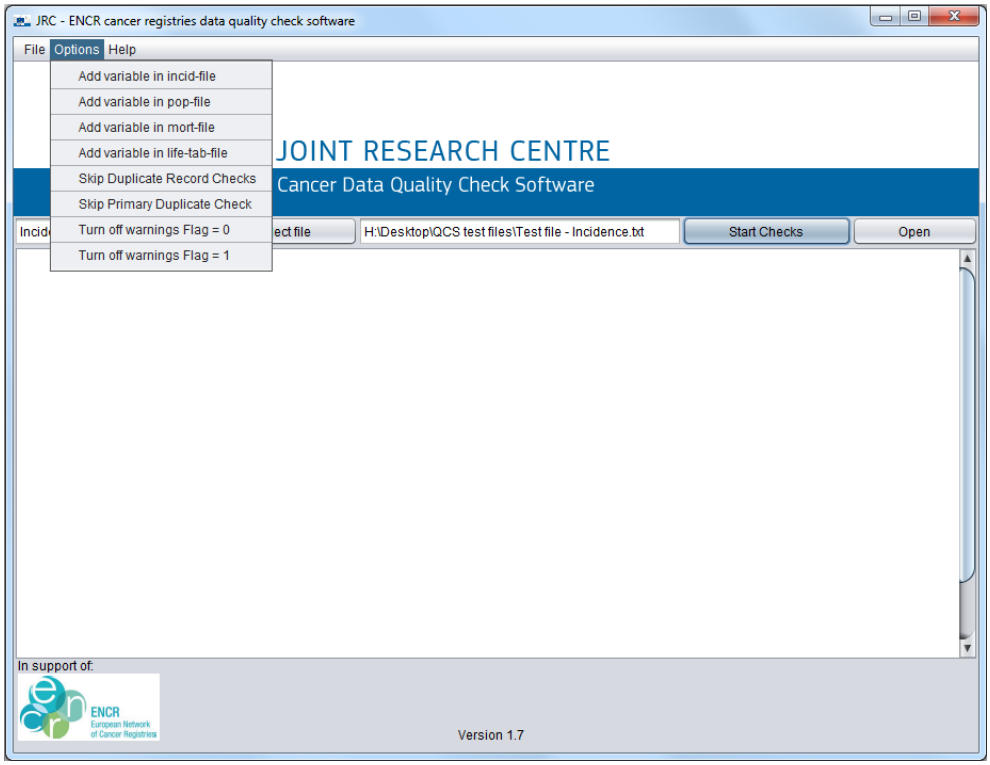
In the same way, you can also check Mortality, Population or Life Table files by selecting the type of the file from the drop down menu.

The procedure for checking such files is the same as described above for Incidence files.

5.2 Other QCS features

5.2.1 Options

In the Options Menu you can find a list of other choices that you can select before running the checks, such as turning off the warnings.



The option menu provides the possibility to the user to add an extra variable to the input file, by clicking one of the options above (e.g. "*Add variable in incid-file*" for the incidence file). For the incidence file, the extra variable **must be named** *57_Registry_Code*. With this option the number of variables required by the QCS is increased by one.

By clicking on "*Skip Duplicate Records Checks*", the software is not searching for duplicated records; this way checks are performed also on such records.

5.2.2 Output files

The output files are located in the subfolders inside the "*output*" folder, depending on the type of the file. For example, output files for an Incidence file are located in the "**\JRC-ENCR-QCS-V1.7\output\Incidence"** folder.

The following two screenshots refer to the *QCS-Incidence-Output.pdf* file:

Upper section

```
-----------------------------------------------------------------------------------------------------------------
QUALITY CHECK SOFTWARE REPORT - INCIDENCE
-----------------------------------------------------------------------------------------------------------------
File process start: 2016-07-18 12:09:52.776
File process end: 2016-07-18 12:09:54.061
Skip duplicate record check: false
Extra variable (registry code): false
Skip Primary Duplicates check : false
Validate by: QCS Version 1.6.5
File Processed:
G:\Folders\test file - incidence 2016-07-18.txt
Number of records read:                2194
Total number of errors:                  30
-----------------------------------------------
 E-OUTR                                   22
-----------------------------------------------
 E-MOBE                                    8
-----------------------------------------------
Number of warnings Flag=0:                 0
Number of warnings Flag=1:                22
-----------------------------------------------
 W-MOTO                                   13
-----------------------------------------------
 W-TOLA                                    2
-----------------------------------------------
 W-BDMO                                    5
-----------------------------------------------
 W-AGMT                                    2
-----------------------------------------------
Total number of records rejected:          0
Total number of duplicate records:         1
Total number of Primary Duplicates:        2
-----------------------------------------------------------------------------------------------------------------
```

Lower section

```
ERROR CODES:

E-MISS: Value missing                                          W-TNMM: TNM + condM not valid (p.41)
E-OUTR: Value out of range                                     W-EoDN: EoD + met_Nodes not valid (p.41)
E-FORM: Format error                                           W-condN:Met_Nodes + condN not valid (p.41)
E-MOBE: Morphology + Behaviour not valid                       W-TNMn: TNM + met_Nodes not valid (p. 41)
E-ECOD: ICD edition + Cause of death not valid                 W-BDMO: Morphology not specified (p.30)
E-DATE: DD/MM/YYYY Non valid                                   W-UNKN:"Unknown" code found
E-SETO: Topography + Sex not valid (tab.4)
E-VBDA: VitalStatus + BoD + Autopsy not valid (p.40)
E-CoDA: DoB + DoI not coherent (p.16)

WARNING CODES:

W-MOGR: Morphology + Behaviour + grade not valid (tab.7)       W-BoDT: BoD + pT not valid (p.40)
W-TNED: EoD + N not valid (p.41)                               W-BDpT: BoD + pT not valid (p.40)
W-TNMA: Age + TNM not valid (tab.2)                            W-BDpN: BoD + pN not valid (p.40)
W-TNMM: Morpho + TNM not valid (tab.2)                         W-BDpM: BoD + pM not valid (p.40)
W-SEMO: Sex + Morphology unlikely combination (tab.5)          W-EDNM: EoD + TNM not valid (p.40)
W-TMED: EoD + M not valid (p.41)                               W-ECdN: EoD + cond N not valid (p.41)
W-TTED: EoD + T not valid (p.41)                               W-TNMN: TNM + condN not valid (p.41)
W-TOLA: Topography + Laterality not valid (p.33)               W-EoDT: EoD + Topography not valid (p.41)
W-TOPN: Topography + Nodes not valid (p.40)                    W-ETNC: EoD + TNM/condN not valid (p.41)
W-TOTS: Topography + Tsize not valid (p.40)                    W-EDCD: EoD + condN/condM not valid (p.41)
W-MOTO: Morphology + Topography not valid (tab.9)              W-AGMT: Unlikely Age + tumour type (tab.3)
W-TNMP: Topo + TNM edition + T,N,M + Stage pathological (tab.2) W-BEGR: Beh + grade not valid (tab.8)
W-TNMC: Topo + TNM edition + T,N,M + Stage clinical (tab.2)    W-BTNM: Beh + TNM not valid (p.41)
-----------------------------------------------------------------------------------------------------------------
        PRIMARY DUPLICATE CHECK
-----------------------------------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------------------------------
 2_Pati  1324658709                                    3_Tumo  00001
-----------------------------------------------------------------------------------------------------------------
 12_BoD  13_Topo  14_Morpho  15_Beh  7_Sex  DoI        DoB        Laterality

-----------------------------------------------------------------------------------------------------------------
 7       C449     8720       3       2      21/1/2004  29/6/1936  3

-----------------------------------------------------------------------------------------------------------------
 2_Pati  1324658709                                    3_Tumo  00002
-----------------------------------------------------------------------------------------------------------------
```

Next to most error and warning codes you can find the code short label, and the reference to the relevant table or page from the *2014 ENCR-JRC Report "A proposal on cancer data quality checks: one common procedure for European cancer registries"*.

Example: "W-MOTO: Morphology + Topography not valid (tab.9)"

Table 9. *Morphology codes and allowed/refused topography codes.*

Morphology codes	Allowed topography codes	Not allowed topography codes
8000-8005		C420, C421, C77
8010-8589		C38, C40-C42, C47, C480, C49, C70-C72, C77

(...)

5.2.3 Help menu

In the "*Help*" menu you will find the option "*Manual and documentation*".

This opens a folder with the present QCS user manual and files:

- *Cancer Data Quality Checks Procedure Report.pdf*: the *2014 ENCR-JRC Report "one common procedure for European cancer registries"*)
- *2015_ENCR_JRC_Call_for_Data_Version_1_1.pdf*
- *2016 Addendum.pdf*: addendum to the *2014 ENCR-JRC Report* and the *2015 ENCR-JRC Call for Data*

In the "*Help*" menu you can also find the "*About*" item, with the credits and copyright statement.

6 How to prepare an input file for the QCS

In this section an example for each type of file accepted by the software will be given.

The input files must follow the following rules:

- Should be semicolon-separated files only
- The first line should be the header

6.1 Incidence File

First, create the header of the file. For this type of file the number of accepted variables is 56.

You can use the following line as header; just copy and paste it, adding the line at the top of your incidence file.

Please note: You can NOT give other names to the variables, in the header. Please make sure that the variables are in the correct order, the correct number of variables is included and they are separated by semicolons (**;**). The header line is mandatory.

1_Flag;2_Patient_ID;3_Tumour_ID;4_Day_DoB;5_Month_DoB;6_Year_DoB;7_Sex;8_Day_DoI;9_Month_DoI;10_Year_DoI;11_Age;12_BoD;13_Topo;14_Morpho;15_Beh;16_Grade;
17_Autopsy;18_Vital_status;19_Day_FU;20_Month_FU;21_Year_FU;22_Survival;23_Laterality;24_Day_DoR;25_Month_DoR;26_Year_DoR;27_Cause_death;28_ICD_edition;29_TNM_prefix;
30_pT;31_pN;32_pM;33_cT;34_cN;35_cM;36_Stage;37_TNM_edition;38_Cond_T;39_Cond_N;40_Cond_M;41_Dukes;42_FIGO;43_AArbor;44_Gleason;45_Breslow;46_EoD;47_Tsize;
48_N_exam_nodes;49_N_met_nodes;50_Sent_nodes;51_Met_sent_nodes;52_Cfactor;53_Surgery;54_Systemic_th;55_Radiotherapy;56_BMtransp

Please note: do NOT put a semicolon at the end of the line. The line ends in "56_BMtransp" and not in "56_BMtransp**;**"

Then create the lines/records with the values of those variables. When you finish with the records of your file, save it in csv or txt format.

You are now ready to load the incidence file into the quality Check Software.

6.2 Mortality File

First, create the header of the file. For this type of file the number of the accepted variables is 5.

You can use the following line as header; just copy and paste it, adding the line at the top of your Mortality file:

1_Calendar_Year;2_Sex;3_Age_Unit;4_Cause_Death;5_Number_Deaths

***Please note**: Please make sure that the variables are in the correct order, in the correct*

number and are separated by semicolons. The header line is mandatory. Do NOT put a semicolon at the end of each line.

Then create the lines/records with the values of those variables. When you finish with the records of your file, save it in csv or txt format.

You are now ready to load the mortality file into the QCS.

6.3 Population File

First, create the header of the file. For this type of file the number of the accepted variables is 4.

You can use the following line as header; just copy and paste it, adding the line at the top of your Population file:

1_Calendar_Year;2_Sex;3_Age_Unit;4_Number_of_residents

Please note: Please make sure that the variables are in the correct order, in the correct number and are separated by semicolons. The header line is mandatory. Do NOT put a semicolon at the end of each line.

Then create the lines/records with the values of those variables. When you finish with the records of your file, save it in csv or txt format.

You are now ready to load the population file into the QCS.

6.4 Life Table File

First create the file header. For this type of file the number of the accepted variables is 4.

You can use the following line as header; just copy and paste it, adding the line at the top of your Life Table file:

1_Calendar_Year;2_Sex;3_Age_Unit;4_ALL_causes_death

Please note: Please make sure that the variables are in the correct order, in the correct number and are separated by semicolons. The header line is mandatory. Do NOT put a semicolon at the end of each line.

Then create the lines/records with the values of those variables When you finish with the records of your file, save it in csv or txt format.

You are now ready to load the life table file into the QCS.

7 After running the quality check

The procedure for incidence files is described here, but it applies also on the other file types.

Correct the errors reported by the software in your database and re-extract a new incidence file. Please refer to the ***QCS-Incidence-FormatErrors.txt*** file or to the ***QCS-Incidence-output-tabularforExcel.csv*** file: the contents are the same, only formatted in different ways. The txt file is more readable, the csv file is best read through a spreadsheet, like Excel.

Run again the software, using the updated incidence file, to be sure you corrected all the errors.

NOTE: Some bugs and issues in the QCS have been detected, and will be solved in the next release. You can find the list of bugs and issues in file "*Known QCS issues and bugs.pdf*"

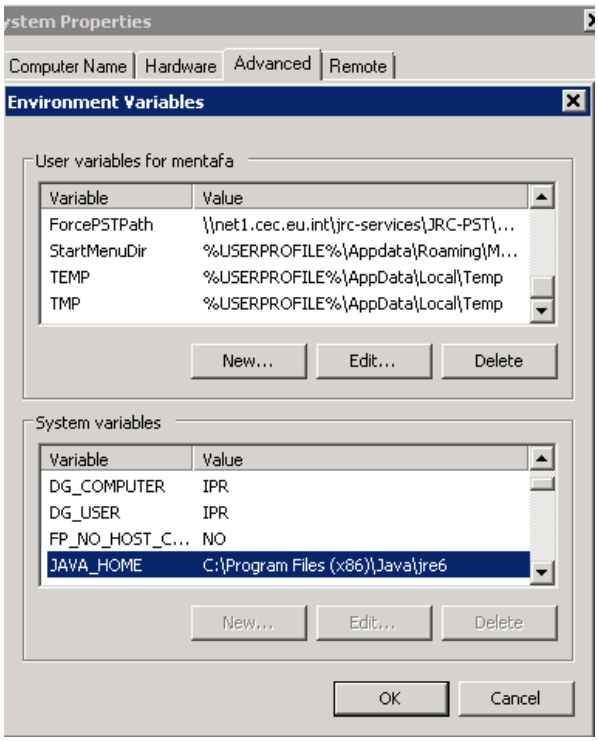
8 Technical issues

If you need help in installing Java Runtime Environment installed on your machine, kindly ask to your System Administrator or local IT support to install it for you.

You will also need the JAVA_HOME environment variable correctly configured. Usually, it is done automatically. Please check with your System Administrator.

In Windows 7 (for other systems the procedure may vary) you must go on Start → Control Panel → System → Advanced System Settings → Environment variables

Kindly refer to the next screenshot:



The official requirements for Java can be found here:
https://www.java.com/en/download/win_sysreq-sm.jsp

The needed Java runtime environment can be downloaded from Oracle at
https://www.java.com
Remember to choose the correct version for your operating system (Windows 32 bit or Windows 64 bit).

Please note: there are two versions, Java Developer Kit (JDK) and Java Runtime Environment (JRE). **Please install JRE**.

Detect older versions (8u20 and later versions).

Starting with Java 8 Update 20 (8u20), on Windows systems, the Java Uninstall Tool is integrated with the installer to provide an option to remove older versions of Java from the system. The change is applicable to 32 bit and 64 bit Windows platforms.

Notifications about disabled Java and restoring prompts

The installer notifies you if Java content is disabled in web browsers, and provides instructions for enabling it. If you previously chose to hide some of the security prompts for applets and Java Web Start applications, the installer provides an option for restoring the prompts. The installer may ask you to reboot your computer if you chose not to restart an internet browser when it prompted you to do so.

Test Installation

To test that Java is installed and working properly on your computer, run this test applet (https://www.java.com/en/download/help/testvm.xml).

NOTE: You may need to restart (close and re-open) your browser to enable the Java installation in your browser.

You might also be interested in:

- Install Java without Sponsor offerings
  (https://www.java.com/en/download/faq/disable_offers.xml)

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JRC Mission

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